GEPHE SUMMARY

Gephebase Gene
resistant to methyl viologen 1 (RMV1) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^resistant to methyl viologen 1 (RMV1)^#gephebase-summary-title)

GepheID
GP00000982

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Polyamine uptake (https://www.gephebase.org/search-criteria?/and+Trait=^Polyamine uptake^#gephebase-summary-title)

Trait State in Taxon A
Arabidopsis thaliana- Col0

Trait State in Taxon B
Arabidopsis thaliana- Nos-d

Ancestral State
Data not curated

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name
thale cress

Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Arabidopsis thaliana- Col0

Taxon B

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name
thale cress

Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Arabidopsis thaliana- Nos-d

GENOTYPIC CHANGE

Generic Gene Name
RMV1

Synonyms
MJJ3.2; MJJ3_2; POLYAMINE UPTAKE TRANSPORTER 3; PUT3; resistant to methyl viologen 1; At5g05630

String
3702.AT5G05630.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT5G05630.1)

Sequence Similarities
Belongs to the amino acid-polyamine-organocation (APC) superfamily. Polyamine:cation symporter (PHS) (TC 2.A.3.12) family.

GO - Molecular Function
GO:0015293 : symporter activity (https://www.ebi.ac.uk/QuickGO/term/GO:0015293)

UniProtKB Arabidopsis thaliana
Q9FFL1 (http://www.uniprot.org/uniprot/Q9FFL1)

GenebankID or UniProtKB
BT008298 (https://www.ncbi.nlm.nih.gov/nuccore/BT008298)

GO:0015203 : polyamine transmembrane transporter activity (https://www.ebi.ac.uk/QuickGO/term/GO:0015203)

GO - Biological Process

GO:0009408 : response to heat (https://www.ebi.ac.uk/QuickGO/term/GO:0009408)
GO:0015839 : cadaverine transport (https://www.ebi.ac.uk/QuickGO/term/GO:0015839)
GO:0015846 : polyamine transport (https://www.ebi.ac.uk/QuickGO/term/GO:0015846)

GO - Cellular Component

GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)

Presumptive Null

Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title)

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)

Aberration Type

SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gephebase-summary-title)

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Ile377Phe

Experimental Evidence

Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Linkage Mapping^#gephebase-summary-title)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Natural variation in a polyamine transporter determines paraquat tolerance in Arabidopsis. (2012) (https://pubmed.ncbi.nlm.nih.gov/22492932)

Authors

Fujita M; Fujita Y; Iuchi S; Yamada K; Kobayashi Y; Urano K; Kobayashi M; Yamaguchi-Shinozaki K; Shinozaki K

Abstract

Polyamines (PAs) are ubiquitous, polycationic compounds that are essential for the growth and survival of all organisms. Although the PA-uptake system plays a key role in mammalian cancer and in plant survival, the underlying molecular mechanisms are not well understood. Here, we identified an Arabidopsis L-type amino acid transporter (LAT) family transporter, named RMV1 (resistant to methyl viologen 1), responsible for uptake of PA and its analog paraquat (PQ). The natural variation in PQ tolerance was determined in 22 Arabidopsis thaliana accessions based on the polymorphic variation of RMV1. An RMV1-GFP fusion protein localized to the plasma membrane in transformed cells. The Arabidopsis rmv1 mutant was highly resistant to PQ because of the reduction of PQ uptake activity. Uptake studies indicated that RMV1 mediates proton gradient-driven PQ transport. RMV1 overexpressing plants were hypersensitive to PA and PQ and showed elevated PA/PQ uptake activity, supporting the notion that PQ enters plant cells via a carrier system that inherently functions in PA transport. Furthermore, we demonstrated that polymorphic variation in RMV1 controls PA/PQ uptake activity. Our identification of a molecular entity for PA/PQ uptake and sensitivity provides an important clue for our understanding of the mechanism and biological significance of PA uptake.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS